Historical Hazard Identification Process for D&D-11036

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ABSTRACT

Facility hazard identification is the critical first step in the Decontamination and Decommissioning (D&D) process. The hazard identification process presented herein is the result of eight years of refinements at the Lawrence Livermore National Laboratory (LLNL). The process is not presented as a one-size-fits-all solution. The current process at LLNL can be used as either a starting point for applicability to other U.S. Department of Energy (DOE) sites without a process in place, or as a benchmark for other sites to evaluate their current processes. It is similar to all planning processes in that it is a living document, changing with the experience of use, new requirements, and lessons learned.

The process does not limit itself to hazard identification since the effort is also intended to provide the technical data and information needed to assist in the production of a D&D project execution plan as well as a facility hazards identification map. This existing process identifies four broad categories of information resources including: facility information, hazard information, environmental information, and general information related to the facility.
The use of this process at LLNL has led to both a level of confidence in hazard identification and a defensible level of due diligence, without excessive sampling and characterization. The hazard identification map has also proven to be an efficient and effective way to communicate existing conditions, potential areas of contamination, and a guide for both sampling and project plans.

WHY?

Hazard identification based on historical data gathering can be critical in ensuring safety and cost-effectiveness. On one project, without this process in place, detonatable quantities of shock sensitive crystallized perchloric acid inside a fume hood would not have been identified. According to an on-site explosives expert, the first 40 feet of the building could have been blown off. This could have resulted in both fatalities and off-site radiological contamination.

INTRODUCTION

The Historical Information Process presented here deals firstly with the justification and elements of the process. The discussion then centers around four major categories of information. How this information is gathered, analyzed, processed, and used is the next phase of the discussion. Examples of the steps in the process and the documents used to gather and organize the data are then shown. The results of this effort are provided to the project manager in two formats. The first is the binder(s) containing the collected information in a systematic format. The second is a hazards map, which summarizes and graphically depicts the hazard information contained in the binders. The project manager uses this information as a baseline to start the project execution plan. Subject matter experts use this information as a starting point for sampling plans.

ASSUMPTION

It is safe to assume that it is prohibitively expensive to sample and test for all potential hazards in every facility slated to be demolished. The issue then becomes how is the breadth of the sampling plan and characterization study to be rationally limited while meeting the legal and ethical requirements for due diligence? The answer to this question is clear. Have a hazard identification process in place and use that process, not to simply identify the hazards, but to document, categorize and map hazards in a way that can be easily and clearly displayed so that all project personnel can use the information.

HISTORICAL INFORMATION PROCESS IDENTIFICATION

The Historical Hazards Identification Process for building D&D as detailed in Figure 1, begins with the D&D Information Manager being given a project with an identified scope and approximate due date. The required data and information is then researched, organized, and placed in binders. Implementation of the Historical Information Process is the first critical step in the demolition of a facility. Many of the other project planning processes cannot take place without this initial research being completed. Potential hazards need to be identified and the potential consequences of their presence evaluated.

Other facility related information must also be collected and organized. These include data related to the management of the facility itself. Facility drain reports, environmental permits, Storm Water Pollution Prevention Plans, and sub-surface information, are examples of each type of data. The building's master equipment list, telecommunications resources, information and data management files must also be taken into account during project planning. Certain specialized facilities may have high-pressure lines and unique cabling and conductors that have been deactivated but not yet flushed and cleaned. Other organizations such as Archives and Security provide unique perspectives, adding to the knowledge base of the project planning data.

Experience has shown that the three most important sources of information are: personnel interviews, historical Incident Analyses and Occurrence Reports, and facility hazard history. Of these three, personnel interviews are by far the most valuable. A more detailed discussion of the personnel interview process is presented later.

There are times when the historical research associated with a facility is placed on hold, and a project is held in reserve, or "shelved". It can then be reactivated when/if required. After the project is completed, information in the form of historical information binders, containing both the facility's historical information and the completed project information is taken to LLNL Archives for final disposition. Identifying information sources, documenting the contacts, and implementing a system of cross checks provides a solid basis for a judgment of due diligence.

It should be noted that this process can be automated to some extent by scanning and storing digitally the collected materials. Scanning documents, adding metadata, and storing takes time and resources, but improves the ability to search for specific topics. Digitizing, although a good aid to access, adds significant work and cost down the line for continual migration as electronic media change. Since planning, obtaining funding for and execution of D&D projects can be a long term process, LLNL places an emphasis on use of hard copy documentation.

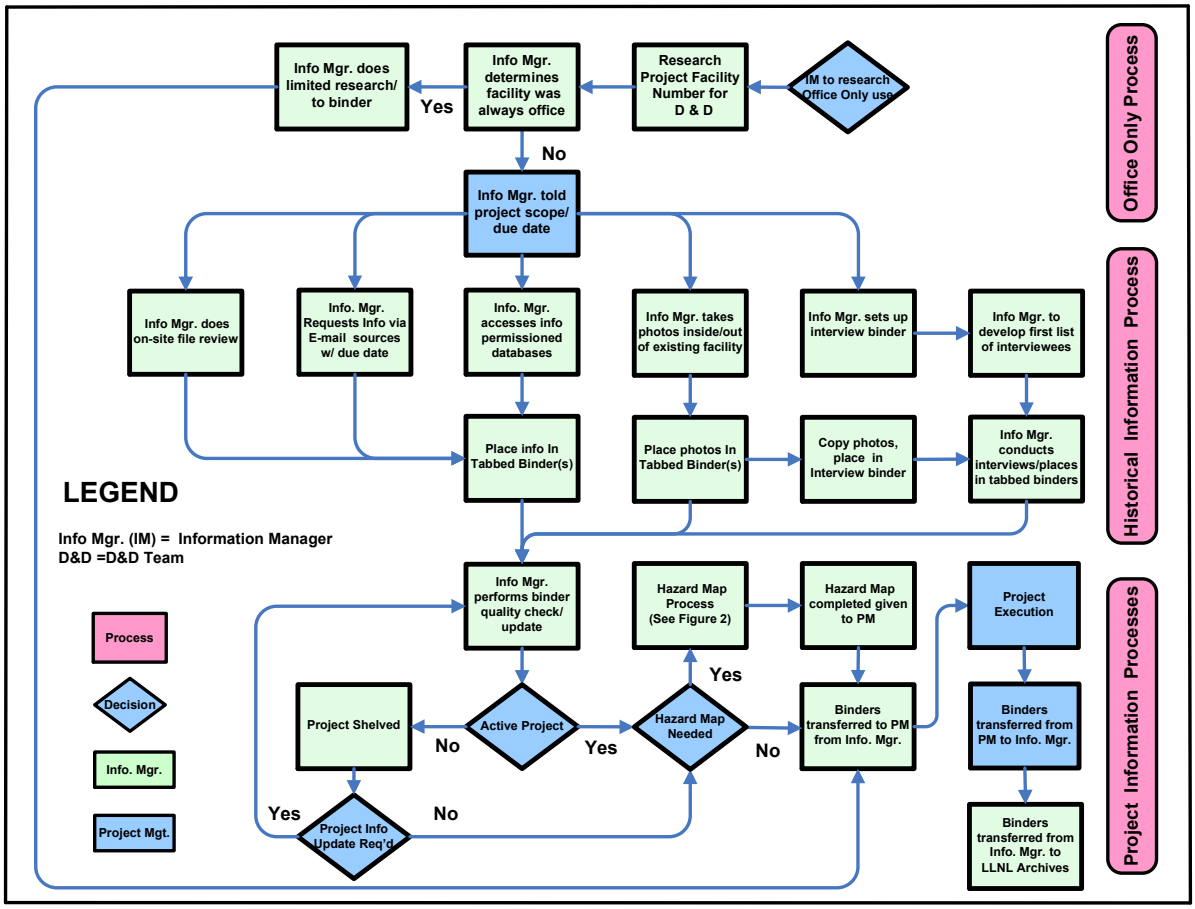

Fig. 1 LLNL Historical Information Process

Facility Designation/Organization File Review

The following sources of information are critical to the identification of a facility's hazards. The first task is to identify the facility's unique designator, both current and historical. At LLNL, facilities are assigned building numbers and these have changed over time. Facilities could have a designation dating back to WWII Naval air station era, or a different number before June 12, 1967, when all the facility numbers were changed. This change renumbered all of the facilities in order to place them in blocks for emergency response purposes.

The second task is to review the previous site plans, using the data from the facility number research as a starting point. The third is a review of the on-site organization files. The salient portions are then copied and placed in 3 ringed binders.

Hazards Information

One of the three most important sources of information is files from an organization that oversees worker safety and health. This organization keeps facility specific hazard information in paper files. Finding the source of this type of information can be a worthwhile exercise. These files include:

- Screening Reports which tell the current hazards associated with the facility
- Non-nuclear safety basis documentation yields a facility hazard classification
- Facility files identify specific facility hazards
- Fire Department files may identify historic hazards
- RAD Survey 10 CFR 835 information
- HEPA filter database information
- Asbestos Report
- High-pressure database identifies high-pressure equipment in the facility

Restricted Database Information

Some of the hazard-related facility information is in restricted databases. Inquiries are made from several sources. The process for accessing this information needs to be done on a site-by-site basis. The following is a partial listing of these sources at LLNL.

- Occurrence Reports
- Incident Analysis
- Classified Programmatic Hazard Information

Environmental Information

The on-site environmental organization provides important information from several internal sources. This information provides the required due diligence effort regarding almost all of the environmental information provided to projects. The balance of the information includes chemical tracking information and the hazardous waste information related to that facility. The environmental organization at LLNL provides information from the following sources:

- Facility Drain Reports
- Operation’s files review
- Environmental Operations Group Spill Reports
- Environmental Permits
- Storm Water Pollution Prevention Plan
- Retention Tank Reports
- National Environmental Policy Act information
- Life-cycle chemical tracking
- Subsurface information
- Hazardous Waste Management Records

Facility Information

This information is not always specifically related to hazards. It is, however, required to produce a project execution plan. Finding and documenting the sources of this type of information, can be a significant time saver. Types of sources/information may include:

- Facility Number Designation (current and historical)
- Master Equipment List
- Phone/ Building Alarm Resources
- Information and Data Management facility files
- Floor plans/ Room size/area sheets/Historical Site Plans/ Photogrammetric maps
- Facility Condition Assessment Survey (CAS)
- Facility Photos-recent and historic
- DOE's Facility Information Tracking System (FITS)
- Issues Tracking System (ITS) Deficiency tracking information

General Information

This category of information provides a place for those data that do not readily fit into the other categories. They include:

- Personnel Interviews
- E-mails/project correspondence
- Property Management Database
- Archives
- Security
- Financial History- used to identify past and current facility 'owners' and types of use
- Records Management- organizational information by facility designation

PERSONAL INTERVIEWS

Personal interviews have been identified as a critical source of facility hazard information. The following guidelines can be used to facilitate the interview process. They are broken down into the following 3 phases:

Phase 1. Pre-Interview Guidelines: Develop interview materials and identify contact information for interviewees.

Phase 2. Guidelines For Conducting Interviews: Conduct interviews, adding additional interviews, when warranted, as the process progresses.

Phase 3. Post Interview Guidelines: Compile the interviews, contact data, and place in tabbed historical information binder(s).

Phase 1. Pre-Interview Guidelines

- The identification of interviewees and the knowledge of how to get in touch with them should be addressed when names are provided.
- Typical inquiries of on-site staff regarding other persons familiar with the facility include:
  - Are they still on-site?
  - Do you know where they live or lived?
  - Do they still work here part-time?
  - If retired, did they move out of state?
  - Are there others who might know where they are?
  - Use "Zabasearch.com" which prompts for name and state of residence to find contact information for retirees.
- Work on having good relations with everyone, especially when identifying contacts at the initial phase of the effort.
- Retirees have some of the best facility hazard knowledge available. If a person is identified repeatedly as someone who knows a lot about a facility, keep calling, and be very polite.
- To identify a persons address use local government land records if you suspect they live in a specific city/county. If they own property, you can generally get important contact information from county/ city clerk's office.
- Be open to doing a "cold call" if the person in question has important and unique knowledge, even if they have "an ax to grind".
- Suggest you bring a floor plan(s) of the facility and other "memory jogger" materials such as a list of typical contaminants (See Figure 3) and especially recent facility photos.
- Multiple copies of floor plans are required so that interviewees can mark directly on them, identifying areas of concern and possible contamination.
- Before the interview make up a contact sheets, documenting the interviewee's personal information, and answers to open-ended questions regarding potential hazards within the facility. Include a question identifying who else might be contacted regarding the facility. (See Figure 2)
- Be willing to go where they live, meet in the middle, whatever it takes to get the interview.
- You may not have a travel budget, and may be forced to conduct phone interviews. If possible, e-mail the questions and related interview material prior to your call. Consider this option only as a last resort. Historically, responses using this approach have been disappointing in both quality and quantity of information.
- Come to the interview with knowledge of the facility after having, for example, taken photos and having researched what went on in the facility over a period of years.
- Bring different color felt-tip pens and hand them to the interviewees so they can mark directly on the documents you bring.
- Be on time and respectful of their time, especially on-site personnel.
- Give both the appearance of being organized and be organized/prepared for the interview.
- A list of typical contaminate types on a single sheet of paper can be a very useful memory jogger. (See Figure 3)
- Consider using a spreadsheet with contact information, date/time contacted, and status/remarks to document calls and allow for follow up.
- Consider setting up a database and asking the interviewee what other facilities he/she has hazard knowledge of.

- Estimate the number of interviews that may be appropriate for this facility. Complexity, size, age, types of contamination, and existing documentation are all relevant issues to address when deciding how many initial sets of questionnaires and graphics to make.
- The identification of interviewees usually starts with the identification of current facility management staff with the greatest familiarity with the building, who, when interviewed, may identify others who have personal knowledge of the potential hazards in the facility.
- These interviews usually start with on-site staff, and as the list develops, often include retirees.

Phase 2. Guidelines For Conducting Interviews

- Show your official credential when visiting retirees off-site as a form of identification and reassurance.
- Demonstrate that you appreciate the fact that they are willing to talk to you. Remember that opinions are formed in the first 30 seconds of the interview that will last a long time.
- Make sure they know you like seniors and value their knowledge, experience, and information.
- Be someone they can trust.
- Briefly explain the steps in the process.
- If they have extensive knowledge of the facility, at the initial contact, ask if the person would be willing to walk through the building. Though this can be a great memory jogger, unless photos and notes can be taken simultaneously, generally with the assistance of a third person, capturing the information this way can be a challenge.
- Listen carefully, and ask leading, open-ended, clarifying and follow-on questions.
- Make friends with interviewees; you may need them again for other facilities.
- If possible, bring a third party to take down the information, so you can be a better listener/interviewer. Trying to write down what is being said while listening is difficult.
- Take down the information for the person who is not at the interview.
- Write so others can read it, easily. Sometimes it means asking the interviewee for just a minute to collect that information.
- When the interview is completed, re-read your notes aloud to the interviewee and verify that you have captured the issues, accurately.

Phase 3 Post Interview Guidelines

- Place all interview documents in a tabbed binder as soon as they are completed.
- If follow-up is needed, schedule it as soon as possible.
- Make sure to write down the names of the other persons to contact when you get back to the office on the contact sheet.
- If more than 2 interviewees have the same person on their, “to be contacted” list, work hard at finding and interviewing that person.
- Consider enough interviews have been done when little or no new information is forthcoming.
- Give them your business card, and ask them to contact you should they think of anything else.
- Send hand written thank you notes the same week as the interview.

Contact Sheet ***(Facility Number)***

Person contacted: _____
Title: _____ Facility Affiliation from _____ to _____
Org. Representation: _____
Date Interviewed: ___/___/___ by _____
Interview type: Personal_____Phone_____E-Mail_____Site Visit_____

Contact Information:_____

What were your job responsibilities?

When? Do you remember any spills, fires, accidents, explosions, and unusual occurrences?

What parts of the building would you be concerned about if you or someone you knew is going to work on this demo?

Who do you think we can contact for more information on the building?

Fig. 2 Interview Contact Sheet

Since it is impossible to list all potentially hazardous substances, the following broad hazard categories and the most prevalent hazardous materials commonly found within each category are listed below. The following form is used as both a memory jogger and a checklist.

Classification of Chemicals/Contaminants

- Organic Chemicals
  - Polychlorobiphenols (PCB)
  - Chloroform
- Solvents (a specific grouping of organic chemicals) (examples)
  - Acetone
  - Toluene
  - Methanol
  - Perchloroethylene (PCE)
  - Trichloroethylene (TCE)
  - Methyl ethyl ketone (MEK)
- Inorganics (examples)
  - Cyanide
  - Boron
  - Silicon
- Heavy Metals (a specific grouping of inorganic chemicals) (examples)
  - Mercury (Hg)
  - Lead (Pb)
  - Arsenic (As)
  - Selenium (Se)
  - Beryllium (Be)
  - Aluminum (Al)
  - Iron (Fe)
  - Lithium (Li)
  - Gold (Au)
  - Silver (Ag)
  - Cobalt (Co)
  - Chromium (Cr)
- Acids (examples)
  - Nitric Acid
  - Hydrochloric Acid
  - Sulfuric Acid
  - Perchloric Acid (if acids were used ask about perchloric, specifically)
- Radionuclides (examples)
  - Uranium-234, 235, 238
  - Thorium-233, 234
  - Plutonium-238
  - Neptunium
  - Cesium-137
  - Cobalt-60
  - Tritium (H3)
  - Strontium-90
  - Europium 152, 154, 154

Fig. 3 Classification of Chemicals / Contaminates

The following Hazard Map process, Figure 4, is typical for the LLNL site. Identifying and tailoring a hazard map process to a specific project can be a useful exercise. Figure 5 is a hazard map example.

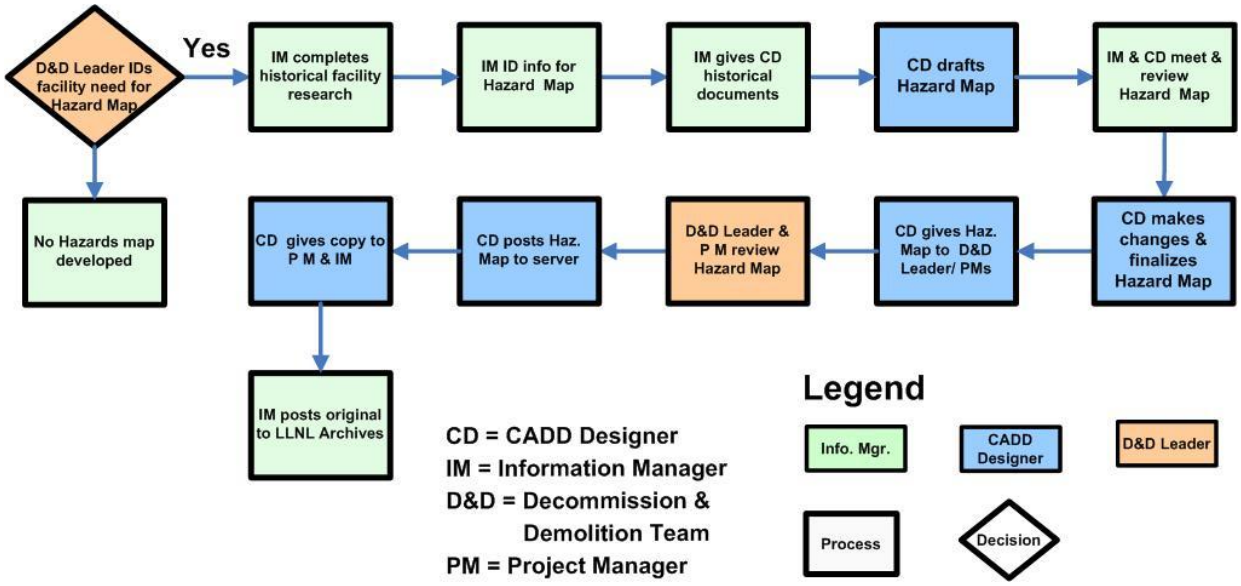

Fig. 4 Hazard Map Process

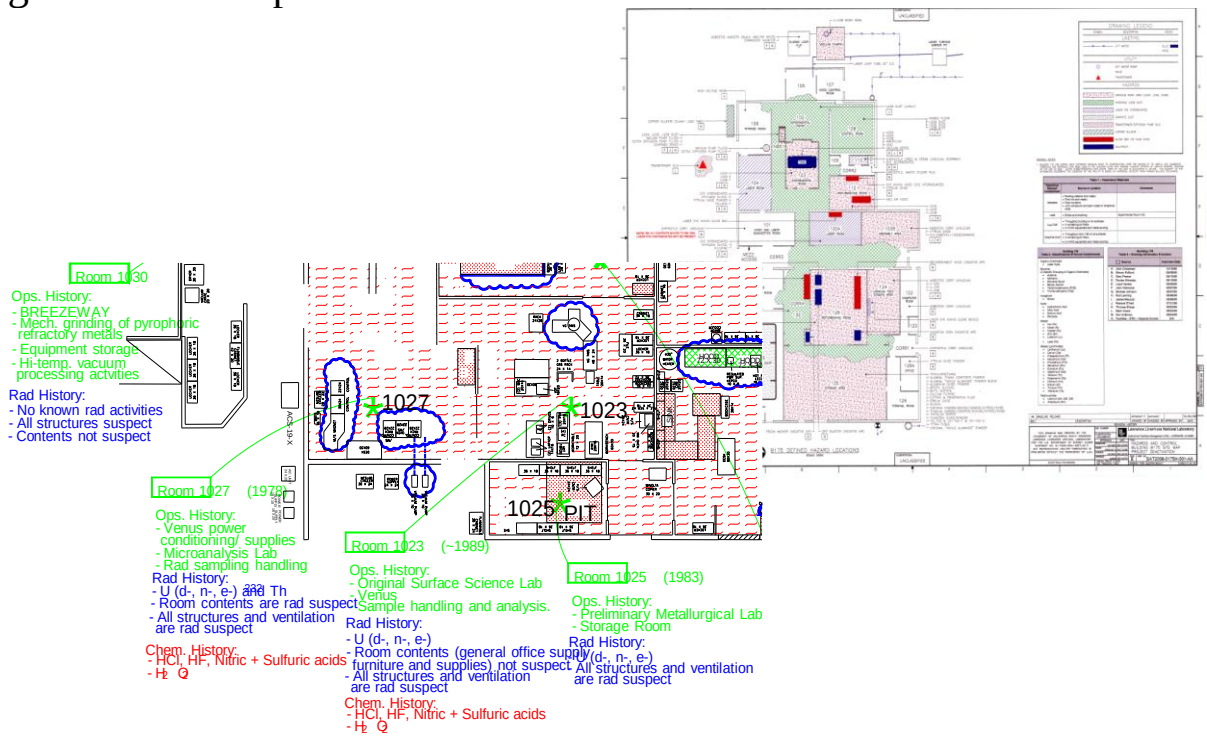

Fig. 5 Sample Hazard Map

Conclusion

While there is no set schedule, it is advisable to start facility hazard research early in the scoping process of potential D&D projects. As time passes it becomes more challenging to access records and contact former employees. The principal purpose of this effort is to keep people from being injured or killed. Early hazard identification will lead to more efficient, compliant, and cost effective project planning and execution.

Reference

P.G. Corrado and M.H. Auble, "Historical Hazards Identification for Building D&D", D&D Team, Version 3.1, Lawrence Livermore National Laboratory (2010).

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Auspices Statement

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. *LLNL-AR-461232*